Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-13_ is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-13_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _1/17/2002_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☒ All   b)☐ Some * c)☐ None of:

   1.☒ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Brian Dollinger

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to because figure elements 10, 11, 32, 33, 34, and 35 are not mentioned in the specification. Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. A correction is required in paragraph 38 line 3 which reads, "prediction masking gate (14), execution unit (14)". The phrase is assumed to be the execution unit is figure element 15 and the sentence should read, "prediction masking gate (14), execution unit (15)". For the rest of this office action this assumption will be made. Correction is required.

4. Claim 13 is objected to because of the following informalities: In line one of claim 13 a third field is discussed but there is no second field within claim 13 or any claim from which claim 13 depends. This field is assumed to be the second field that is being added onto the instruction. Appropriate correction is required.

5. Claims 3, 4, and 8 are objected to because of the following informalities: The phrase "always used" in claims 3, 4, and 8 is confusing. The use of the predicted value during and after the execution of the instruction is unclear. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 3, 4, 8, 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims 3, 4, 8, and 13 refer to "it" in the phrase "regardless of whether it is true of false". It is unknown to the examiner what is being referred to by "it". Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form

the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Gabbay

et al. in *Can program profiling support value prediction?*.

10. As per claim 1 Gabbay et al. taught:

   10.1.   A processor (page 273 col. 2 line 10)

   10.2.   Comprising means for executing an instruction that includes a field in

   which a value may be assigned as a mark of enabling that a value as the result

   of execution of the instruction is predicted prior to or in concurrence with the

   execution of the instruction (page 274 col. 2 lines 12-15, 21-24, and figure 3.1).

   10.3.   And a subsequent instruction is provisionally executed by using the

   predicted result (page 270 col. 1 lines 3-6).

11. As per claim 2 Gabbay et al. taught an instruction including a field to contain a value

that designates a method of predicting a value as the result of execution of the

instruction (page 274 col. 2 lines 14-21).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. Claims 5, 6, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gabbay et al.

14. As per claim 5 Gabbay et al. taught:

    14.1.   A processor (page 273 col. 2 line 10).

    14.2.   Wherein a field in which a value may be assigned as a mark of enabling that a value as the result of execution of the instruction is predicted prior to or in concurrence with the execution of the instruction (page 274 col. 2 lines 12-15, 21-24, and figure 3.1).

    14.3.   And a subsequent instruction is provisionally executed by using the predicted result is attached to each instruction stored into the cache memory (page 270 col. 1 lines 3-6).

15. Gabbay et al. did not teach a processor provided with a cache memory to store instructions however the dictionary definition from High-Tech Dictionary states:

> Definition for cache memory; a high-speed buffer storage that is smaller than the main storage. The cache memory temporarily stores instructions and data from the main storage that will likely be used next by the CPU.

16. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a cache memory in Gabbay et al.'s processor because it provides a high-speed buffer for instructions and data for the processor.

17. As per claim 6 Gabbay et al. taught a field to contain a value that designates a

method of predicting a value as the result of execution of the instruction is further

attached to each instruction stored into the cache memory (page 274 col. 2 lines 14-

21).

18. As per Claim 9 Gabbay et al. taught a processor comprising:

18.1.   A field is attached, the field in which a value may be assigned as a mark of

enabling that a value as the result of execution of the instruction is predicted

prior to or in concurrence with the execution of the instruction (page 274 col. 2

lines 12-15, 21-24, and figure 3.1).

18.2.   And a subsequent instruction is provisionally executed by using the

predicted result (page 270 col. 1 lines 3-6).

18.3.   A value prediction means which predicts a value as the result of execution

of an instruction prior to or in concurrence with the execution of the instruction

(page 271 col. 2 lines 25-55, page 272 col. 1 lines 1-4, and figure 2.1).

18.4.   An execution means which fetches an instruction from the cache memory

and executes the instruction (page 272 col. 1 line 29)

18.5.   A gating means which enables outputting the result of prediction made by

said value prediction means only for an instruction with said mark contained in

its first field so as to be used in executing a subsequent instruction (page 271

col. 2 lines 26-30).

18.6.   And a storage means which stores the predicted result of execution of an

instruction passed through said gating means and the result of executing the

instruction by said execution means for further processing (page 271 col. 2 lines

26-30).

19. Gabbay et al. did not teach a processor provided with a cache memory to store

instructions however the cache memory the dictionary definition from High-Tech

Dictionary states:

> Definition for cache memory; a high-speed buffer storage that is smaller than the main storage.
>
> The cache memory temporarily stores instructions and data from the main storage that will likely
>
> be used next by the CPU.

20. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to have included a cache memory in Gabbay et al.'s processor because it

provides a high-speed buffer for instructions and data for the processor.

21. Claims 7, 10, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Gabbay et al. as applied to claims 5 and 9 above, and further in view of Lipasti

et al. in *Exceeding the dataflow limit via value prediction.*

22. As per claim 7 Gabbay et al. did not teach a means for updating the values existing

in the fields provided for each instruction stored into the cache memory, depending

on whether the predicted value as the result of execution of the instruction is true or

false. However Lipasti et al. taught a means for updating the values existing in the

fields provided for each instruction stored into tables, depending on whether the

predicted value was correctly predicted (page 229 col. 2 lines 27-35 and page 230

col. 1 lines 1-11).

23. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to have combined Lipasti et al.'s updating methodology with Gabbay et

al.'s processor because it would increase the accuracy of predictions and avoid

unnecessary predictions (Lipasti et al. page 230 col. 1 lines 6-11).

24. As per Claim 10 Gabbay et al. did not teach determining a match/mismatch between

the result of prediction made by value prediction and the result of instruction

execution for each instruction to be executed. However Lipasti et al. taught a means

for determining a match/mismatch between the result of prediction made by value

prediction and the result of instruction (page 230 col. 1 lines 7-9).

25. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to have combined Lipasti et al.'s prediction checking and Gabbay et al.'s

predictor because the goal of Gabbay et al.'s discussion was to increase the

percentage of correct value predictions. When the dynamic hardware was tested

against the static approach the two different methods tested better in different areas

(Gabbay et al. page 278 col. 1 lines 4-24). The pre-compiled prediction method did

not have to take time to gain any information about the instructions during runtime.

The dynamic hardware method correctly predicted more instructions then the pre-

compiled version. A hybrid version would have the benefits of both methods.

26. As per claim 11 Gabbay et al. taught a field attached to an instruction to be stored

into cache memory, containing a value that designates a method of predicting the

result of execution of the instruction and said value prediction means predicts the

result of execution of each instruction by using the prediction method designated by

the contents of the second field of the instruction (page 274 col. 2 lines 14-21).

27. As per claim 12 Gabbay et al. did not teach a means for updating the contents of the fields of an instruction stored in the cache memory if the means for determining a match/mismatch has determined a mismatch for the instruction. However Lipasti et al. taught a means for updating the values existing in the fields provided for each instruction stored into tables, depending on whether the predicted value was correctly predicted (page 229 col. 2 lines 27-35 and page 230 col. 1 lines 1-11).

28. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined Lipasti et al.'s updating methodology with Gabbay et al.'s processor because it would increase the accuracy of predictions and avoid unnecessary predictions (Lipasti et al. page 230 col. 1 lines 6-11).

29. Claims 2, 6, 7, 10, 11, and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

30. Claims 3, 4, 8, and 13 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Heisch et al. (U.S. 5659752), Lee et al. (U.S. 4755966), Favor et al. (U.S. 5649137), B. Calder, G. Reinman, and D.M. Tullsen, *Selective value prediction*, T. Nakra, R. Gupta, and M.L. Soffa, *Value prediction in VLIW,* Iwata Yasushi JPO 2000-056971.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian D Dollinger whose telephone number is (703)-3058978. The examiner can normally be reached on 8-4:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703)305-9712. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RICHARD L. ELLIS
PRIMARY EXAMINER

BDD